



(11) EP 1 078 719 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:  
28.02.2001 Bulletin 2001/09

(51) Int. Cl.<sup>7</sup>: B25B 27/14

(21) Application number: 00300112.0

(22) Date of filing: 10.01.2000

(84) Designated Contracting States:  
DE FR GB IT  
Designated Extension States:  
AL LT LV MK RO SI

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(30) Priority: 20.08.1999 JP 23481699

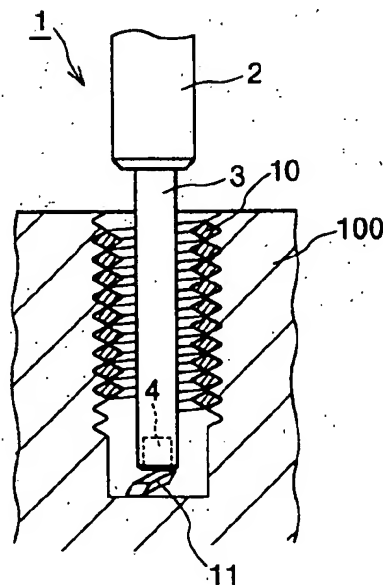
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(54) Tang break-off tool

(57) The present invention provides a tang break-off tool which makes it possible to break off the tang after inserting the spiral coil insert with the tang into the tap-hole of the work, and further, to easily and with certainty remove the broken tang. The tool has a grip section (2) and an operating section (3), and has a permanent magnet (4) provided at the leading end of the operating section (3).

FIG. 3C



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## Description

## BACKGROUND OF THE INVENTION

## Field of the Invention

[0001] The present invention relates to a tang break-off tool which permits breaking off a tang after inserting a spiral coil insert with a tang into a taphole of a work, and the further removal of the tang as broken off.

## Description of the Related Art

[0002] When a weak female screw makes it impossible to obtain a high tightening force while directly tapping into a work comprising a light metal such as aluminum, plastics, wood or cast iron, it is the conventional practice to use a tanged spiral coil insert for the purpose of ensuring a high reliable screw tightening. Fig. 5 illustrates an example of the tanged spiral coil insert.

[0003] As shown in Fig. 5, a spiral coil insert with a tang 10 is usually manufactured by winding a high strength special steel wire having a rhombic cross-section into a spring-shaped cylinder. It is screwed into a taphole 101 formed in a work 100 by means of an inserting tool, as shown in fig. 6, and fixed therein. Thereafter, a bolt 20 or the like is screw-engaged with this spiral coil insert 10 as a female screw. By using the spiral coil insert 10 as described above, it is possible to obtain a high screw tightening force, to repeatedly insert the bolt 20, and to remove the same.

[0004] Because the tanged spiral coil insert 10 is screwed into the taphole 101 by the use of the insertion tool as described above, a stopper piece 11, folded in the radial direction of the coil, known as a tang engaged to the insertion tool is provided at the coil free end as shown in fig. 5. After the coil insert 10 is secured in the taphole 101 of the work 100, this tang must be removed. For this purpose, a notch 12 is formed on the outer side surface of the coil at a first coil portion to be connected to the coil free end on which the tang 11 is formed.

[0005] From the tanged spiral coil insert 10 as described above, the tang 11 is broken off after attachment to the work 100, and the broken tang 11 must be collected. Particularly when the taphole 101 of the work 100 takes the form of a blind hole, this operation is very difficult. If collection of the separated tang 11 fails, the tang 11 may cause electrical or mechanical failure. It is therefore necessary to remove the separated tang without fail.

[0006] When the taphole 101 of the work 100 is formed into a blind hole, it is the present practice to remove the separated tang 11 by, for example, tilting the work 100. This practice is not effective however when the work is large in size. When the tanged spiral coil insert 10 is large in size, the separated tang can be

removed by the use of a pincette or the like. However, in the case of a small-diameter tanged spiral coil insert 10, this practice is sometimes not applicable. There is therefore a demand for a method of certain and easy removal of the separated tang.

[0007] As a result of extensive studies and experiments carried out to solve the above-mentioned problems, the present inventor obtained the following findings. Even when a tanged spiral coil insert 10 is prepared through many cold working steps by the use of 18-8 stainless steel (SUS304) wire usually considered to be a non-magnetic material, the prepared tanged spiral coil insert 10 exhibits properties of magnetic material. The inventor found, in view of this fact, the possibility of being able to remove a snapped tang by attracting it with a magnet.

[0008] The present invention is based on such novel findings obtained by the inventor.

## SUMMARY OF THE INVENTION

[0009] The present invention has therefore an object to provide a tang break-off tool which, after attaching a spiral coil insert with a tang to a taphole of a work, makes it possible to break off the tang, and further, to facilitate the easy and certain removal of the broken tang.

[0010] The aforementioned object is achieved by the use of the tang break-off tool of the invention. In summary, the invention relates to a tang break-off tool having a grip section, an operating section and a permanent magnet provided on the leading end of the operating section.

[0011] According to an embodiment of the invention, the above-mentioned permanent magnet is secured in a recess formed on the leading end of the operating section. The permanent magnet should preferably not project from the leading end of the operating section.

## BRIEF DESCRIPTION OF THE DRAWINGS

## [0012]

Fig. 1 is a perspective view illustrating an embodiment of the tang break-off tool of the present invention;

Fig. 2 is an enlarged sectional view illustrating the configuration of the leading end of the tang break-off tool of the invention;

Fig. 3 illustrates the manner of use of the tang break-off tool of the invention;

Fig. 4 illustrates the manner of use of the tang break-off tool of the invention;

Fig. 5 is a perspective view of a tang spiral coil insert; and

Fig. 6 illustrates the tang spiral coil insert being attached to a work.

# DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The tang break-off tool of the present invention will now be described in further detail with reference to the drawings.

[0014] Fig. 1 illustrates an embodiment of the tang break-off tool of the invention. According to this embodiment, the tang break-off tool 1 has a grip section 2 and an operating section 3. The grip section 2 has a size which permits easy grip by an operator; in this embodiment, the grip section 2 has a diameter (D) of 10 mm and a length of 8 cm, but is not limited. The geometry of the operating section 3, varying with the size of the tanged spiral coil insert 10 used, comprises a diameter of 4 mm and a length of 3.5 cm in this embodiment, so that it serves as a tool for a tanged spiral coil insert 10 having an inside diameter of 5 mm and a length of about 1 cm. In this embodiment, the grip section 2 and the operating section 3 are prepared as one body from a steel material such as S45C, but it may be made of any arbitrary material.

[0015] According to the invention, as shown in Fig. 2, a permanent magnet 4 is arranged on the leading end of the operating section 3. In this embodiment, a recess 5 is formed at the leading end of the operating section 3, and the permanent magnet 4 is secured in the recess 5 with an adhesive or the like. It is preferable that the permanent magnet 4 does not project from the leading end of the operating section 3; in the present embodiment, it is located at a position about 0.5 mm in depth (h2). In this configuration, upon breaking off a tang 11 with the tool, it is possible to prevent the permanent magnet 4 from coming into contact with the tang 11 and causing a damage thereto.

[0016] The strength of the magnet 4 is such that the tang snapped off from the tanged spiral coil insert 10 can be attracted. In this embodiment, a magnet having a diameter (d1) of 3 mm and a height (h1) of 4 mm and having different magnet poles on both surfaces as shown in Fig. 2 is used, but the geometry of the magnet 4 is not limited to this.

[0017] A manner of use of the tool 1 having the above-mentioned configuration of the invention will now be described with reference to Fig. 3.

[0018] As shown in Fig. 3(A), when the tanged spiral coil insert 10 is attached to the work 100, the tool 1 of the invention is inserted into the tanged spiral coil insert 10, and brings the leading end of the operating section 3 into contact with the tang 11 of the tanged spiral coil insert 10. Then, the tang 11 is broken off at a notch 12 (Fig. 5) by hitting the top end of the grip section 2 with a tool such as a hammer. The tang 11 broken off as described above is illustrated in Fig. 3(B). It is needless to mention that the tanged spiral coil insert 10 is prepared from a material having properties of a magnetic material as a result of cold working, such as a 18-8 stainless steel wire, or an arbitrary material believed

to be magnetic material.

[0019] After breaking off the tang 11, the snapped tang 11 is attracted by the magnet 4 of the operating section 3 at the leading end of the tool, as shown in Fig. 3(C); by causing the tool 1 to descend. In this state, the tang 11 can be taken out as shown in Fig. 4 by pulling up the tool 1.

[0020] As described above, the tang break-off tool of the present invention has a grip section and an operating section and has a permanent magnet provided at the leading end of the operating section. It is therefore possible to break off the tang after inserting the tanged spiral coil insert into the taphole of the work, and further, to easily and with certainty remove the tang as broken off.

## Claims

1. A tang break-off tool having a grip section and a working section, wherein a permanent magnet is provided at the leading end of said working section.
2. A tang break-off tool according to claim 1, wherein said permanent magnet is secured in a recess formed at the leading end of said working section.
3. A tang break-off tool according to claim 1 or 2, wherein said permanent magnet does not project from the leading end of said working section.

FIG. 1

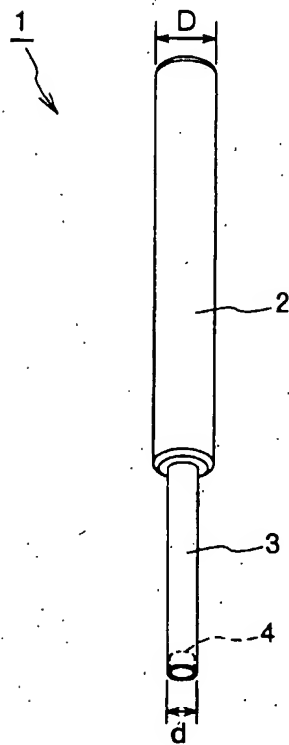


FIG. 2

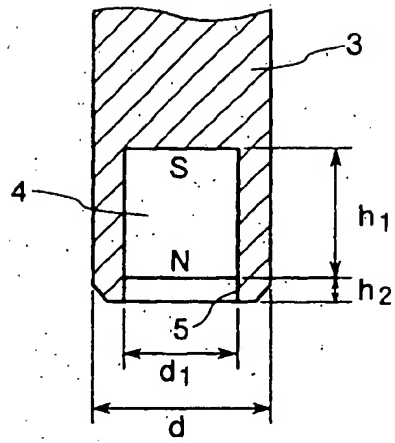


FIG. 3C

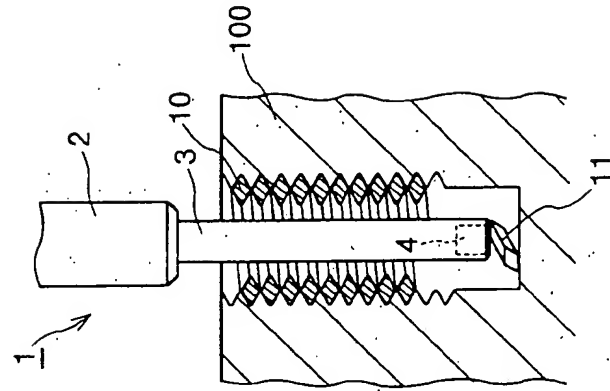


FIG. 3B

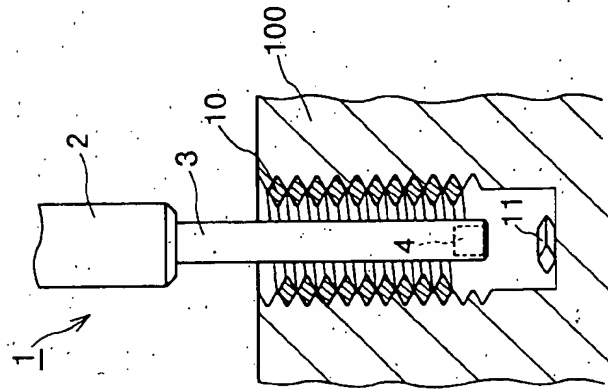


FIG. 3A

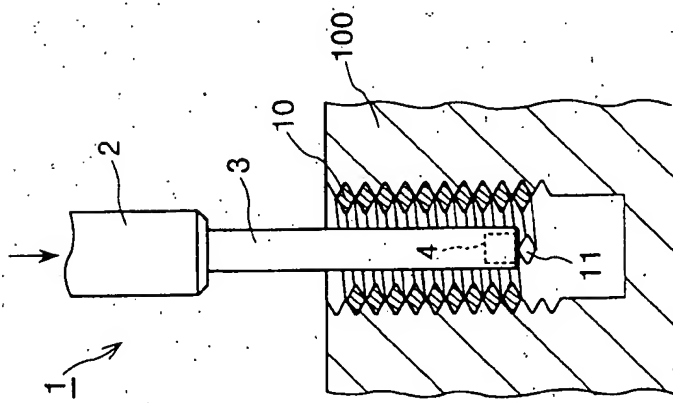


FIG. 4

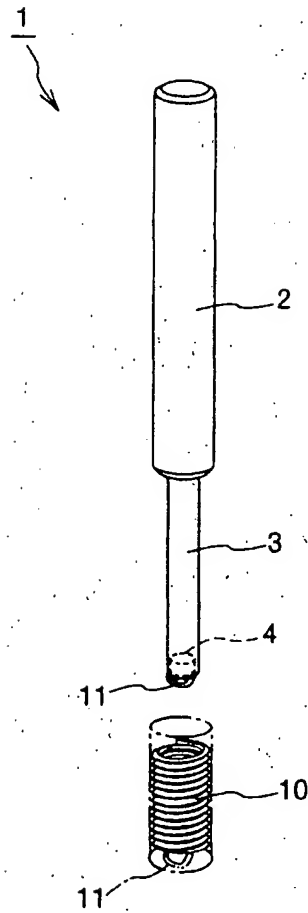


FIG. 5

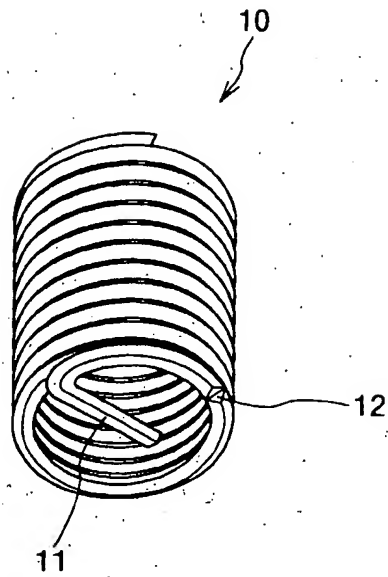




FIG. 6

